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CULTURAL DIFFERENCES AND PATHOTOXICITY OF *HELMINTHOSPORIUM MAYDIS* RACE 'O' AND 'T'

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Corn leaf blight disease caused by *Helminthosporium maydis* (Syn. *Cochliobolus heterostrophus*) has been found to occur in India. Both the races O and T occur in India, the former being less pathogenic than the latter. Corn plants with texas male sterile (Tms) and Normal (N) cytoplasm are susceptible and resistant to corn leaf blight disease respectively. The lesions produced on the leaves of Tms cytoplasm corns by race T were larger than thpse produce by race O or T on the normal cytoplasm corms. Cultures of race T and race O were whitish and dark olive grey respectively when grown under 28±1°C. Corn root bioassay indicates that race T produces a pathotoxin and inhibites the growth of corn root but race O fails to produce it.

INTRODUCTION

Corn leaf blight disease of maize caused by *Helminthosporium maydis* Nisikado & Miyake (Syn. *Cochliobolus heterostrophus)* race T is one of the most destructive diseases of maize and is responsible for Southern Corn leaf blight epidemic of 1970 in the United States (Hooker *et al*, 1970). *H, maydis* has two physiological races, namely race O and race T, the former being less aggressive than the latter. Disease symptoms mainly express in the leaves and resemble those reported for the overseas. The pathogen producing characteristic blight symptoms on leaf were isolated from diseased tissues and behaved similarly in culture. Pathogenesity tests reveal more symtoms on maize with Tms cytoplasm.

MATERIALS AND METHODS

Different isolates of *H. maydis* races O and T were obtained from corn leaves and kernels from widely seperated geographical areas of India. Conidia were collected from sporulating lesions on leaves placed on moistened filter paper in petri plates. Single spore isolates were grown on potato—dextrose—agar (PDA) supplemented with maize leaf straw extract (20 g leaf straw extract/ 1000 ml of medium) at various temperatures under 16 hr of cool white fluoreseent lamps with a light intensity of ca, 250 ft—c at the level of culture or

wrapped in aluminium foil for dark treatments. Four replicates were kept for each treatment and the experiment was repeated at least three times.

Three week old corn plants with Tms and N cytoplasm were artificially inoculated with the spore suspension (50,000/ml) of *H. maydis* race O and T and kept in moist chamber at 25±1°C for 24 hours to facilitate infection, kept at a temperature of 25±1°C. Control plants were sprayed with distilled water.

Symptoms on leaves were measured 48 hours after inoculation as to lesion size, extent of chlorosis and extent of flaccidity, then given 1—4 rating (Nelson *et el,* 1971).

1=Small lesions (less than 1 mm long), no chlorosis, no flaccidity ;

2=Large lesions (1—4 mm long), some chlorosis, no flaccidity ;

3=Large lesions (over 4 mm long), slight chlorosis, some flaccidity ;

4=Large lesions (over 4 mm long), very flaccid.

Culture filtrate of the various isolates of *H. maydis* were tested for toxin production by corn root bioassay method (Luke and Wheeler, 1975). Each isolate of *H. maydis* was grown on 20 ml of petato—dextrose-broth (PDB) in 250 ml of Erlenmeyer flask. Culture filtrates were prepared by seperating the broth of 5-days old cultures through two layers of cheesecloth. W64A (Tms) and W64A(N) cytoplasm corn seeds seeds germinated on moistened vermiculite were selected when the roots were 3—5 mm in length. Ten uniform seedlings were placed in each assay plate and toxin activity was determined by the inhibition of primary root elongation compared with root growth of the control.

RESULTS AND DISCUSSION

Colonies of race T were white whereas cultures of race O were dark olive grey when grown at 28±1°C under continuous illumination. This cultural distinction also involves difference in sporulation. Optimum sporulation for race O was 25±1°C in continuous light and 28±1°C in darkness. Optimum sporulation for race T was 20±1°C under continuous light and 24±1°C in continuous darkness.

Both races O and T of *H. maydis* infect and produce lesions on leaves of either Tms cytoplasm or normal cytoplasm corns. The lesions produced on the leaves of Tms cytoplasm corn by race T of *H. maydis* were larger than those produced by either race O or race T on the normal cytoplasm corns (Table 1). Race T produces a pathotoxin when grown *in vitro* whereas race O fails to produce it. This pathotoxin strongly inhibits the root growth of Tms cytoplasm corns and not of normal corn seedlings (Table 2). Production of large lesions on the leaves of Tms cytoplasm by rase T can be accounted for the host specefic toxin produced by race T of *H. maydis*.

Table 1. *Pathogenesity test of race O and T of* Helminthosporium maydis *on Tms and normal cytoplasm corns.*

Varieties	Disease rating	
	Race T infected	Race O infected
W64A^T	4.0	2.2
W64A	2.0	2.5
B37^T	3.9	2.5
B37	2.0	2.3
C103^T	4.0	2.4
C103	2.7	2.6
OH45B^T	3.8	2.8
OH45B	2.7	2.8

T=Tms cytoplasm

Table 2. *Percentage inhibition of corn root growth by* Helminthosporium maydis *pathotoxin.*

Toxin concentration %	Percentage inhibition of corn root growth			
	Culture filtrate of race T		Culture filtrate of race O	
	N	Tms	N	Tms
0.2	2	7	0.35	0.38
0.4	6	15	0.82	0.94
1.0	8	56	1.25	1.56
2.0	12	74	1.42	1.88
10.0	28	90	2.50	4.64

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